

669.3

# DELTA METAL.

669.3-1

Gold Medal . . . . . Glasgow, 1883.  
Diploma of Honor . London, 1884.  
Gold Medal . . . . . Antwerp, 1885.  
Silver Medal . . . . . Nürnberg, 1885.  
Silver Medal . . . . . London, 1885.  
Gold Medal . . . . . London, 1886.  
Gold Medal . . . . . Liverpool, 1886.  
Gold Medal . . . . . Havre, 1887.

THE DELTA METAL COMPANY, LTD.,

110, CANNON STREET,

LONDON, E.C.







# DELTA METAL.

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**D**ELTA METAL is an improved Copper alloy; it can be made as tough as Wrought Iron, and as **STRONG AS STEEL**. It can be **forged, stamped,** and rolled **hot**, and will stand being worked, drawn and spun when cold.

When melted, the metal runs freely, and perfectly sound castings of fine close grain, and as strong as wrought iron, are produced from it. Its colour resembles that of Gold alloyed with Silver; it takes a high polish, and when exposed to the atmosphere will tarnish less than bronze or brass. It resists the action of sea-water and chemicals better than any bronze, and *does not draw verdigris* like the latter.

The Prices of Delta Metal—Ingots, Sheets, Rods, Wire, &c.—are the same as those of best brass, and vary slightly with the composition of the metal.

Its great strength, durability and hardness recommend it for all kinds of Engineering Work, such as Pump Rods, Plungers, Valve Spindles, Bolts and Nuts, Studs, Propellers, Metallic Valves, Piston Rings, Boiler Stays, Water Meters, Filters, &c., &c., whilst its fine rich colour has secured for it a large market in ships, house and engine fittings, sanitary, hydraulic, mining, and cabinet work, and in connection with other trades.

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Table Showing the Comparative Tensile Strength of  
Delta Metal, Iron, Brass, and Gun Metal.

**DELTA METAL:—**

Cast in sand (green) breaking strain of	20·9 tons	per square inch.
Rolled hard ( $1\frac{1}{2}$ -inch bars)	33·9 "	" "
annealed "	29·8 "	" "
Drawn into wire of No. 22 w.g.	62·5 "	" "
Wrought iron (Molesworth's E.P. Book)	22·0 "	" "
Brass, cast	8·0 "	" "
" wire	22·0 "	" "
Gun Metal, cast	16·1 "	" "



# DELTA METAL FORGINGS

PUMP RODS, PLUNGERS, VALVE SPINDLES, SHAFTS, BOLTS, NUTS, PROPELLERS & PROPELLER STUDS, KINGSTON VALVES, CRANKS, BOILER STAYS, BEARINGS, ANCHORS, &c., &c.

FORGED DELTA METAL is as strong as Good Steel, and resists the action of sea and acid water better than bronze.

The Stalk of a Valve Spindle  $\frac{9}{16}$ -in. diameter at small end, drawn out of a 2 in. chill cast Delta Metal Billet was cut from the forging, and tested, with results, as per copy below:—

LLOYD'S PROVING HOUSE,  
CARDIFF,  
December 20th, 1887.

MESSRS. THE USKSID E ENGINEERING & RIVET COMPANY,  
USKSID E IRON WORKS, NEWPORT, MON.

This is to Certify that the sample of Delta Metal received from you, and described hereunder, has been proved at this Public Proving Machine to the following test, viz. :—

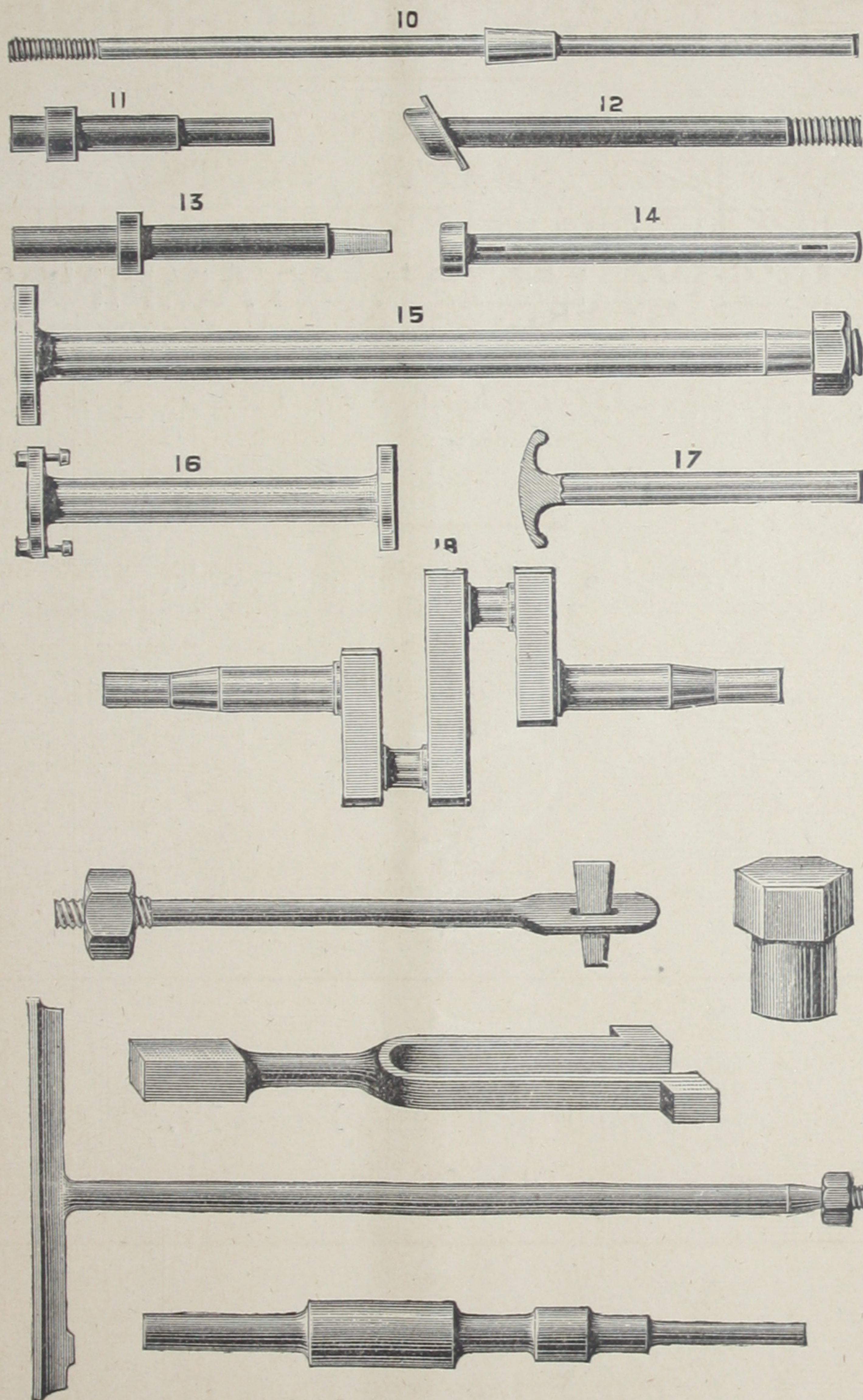
*(The sample was reduced in centre for testing).*

No. OF SAMPLE	Size.		Area.			Elongation in Three Inches.		Ultimate Stress.		REMARKS.
	Before Testing	After Testing	Before Testing	After Testing	Per cent. of Con- traction	Inches.	Per cent.	Actual Tons.	Tons per Square Inch.	
1	'506	'412	'201	'133	34'32	'90	33'0	7'05	35.07	Broke in reduced part; good fractures.

(Signed) GEO. W. PENN,  
Superintendent.

For Prices see Page 17.







## DELTA METAL STAMPINGS

are as strong as Steel, that is, four times stronger than Brass Castings. They leave the dies almost perfect, requiring little tooling afterwards.

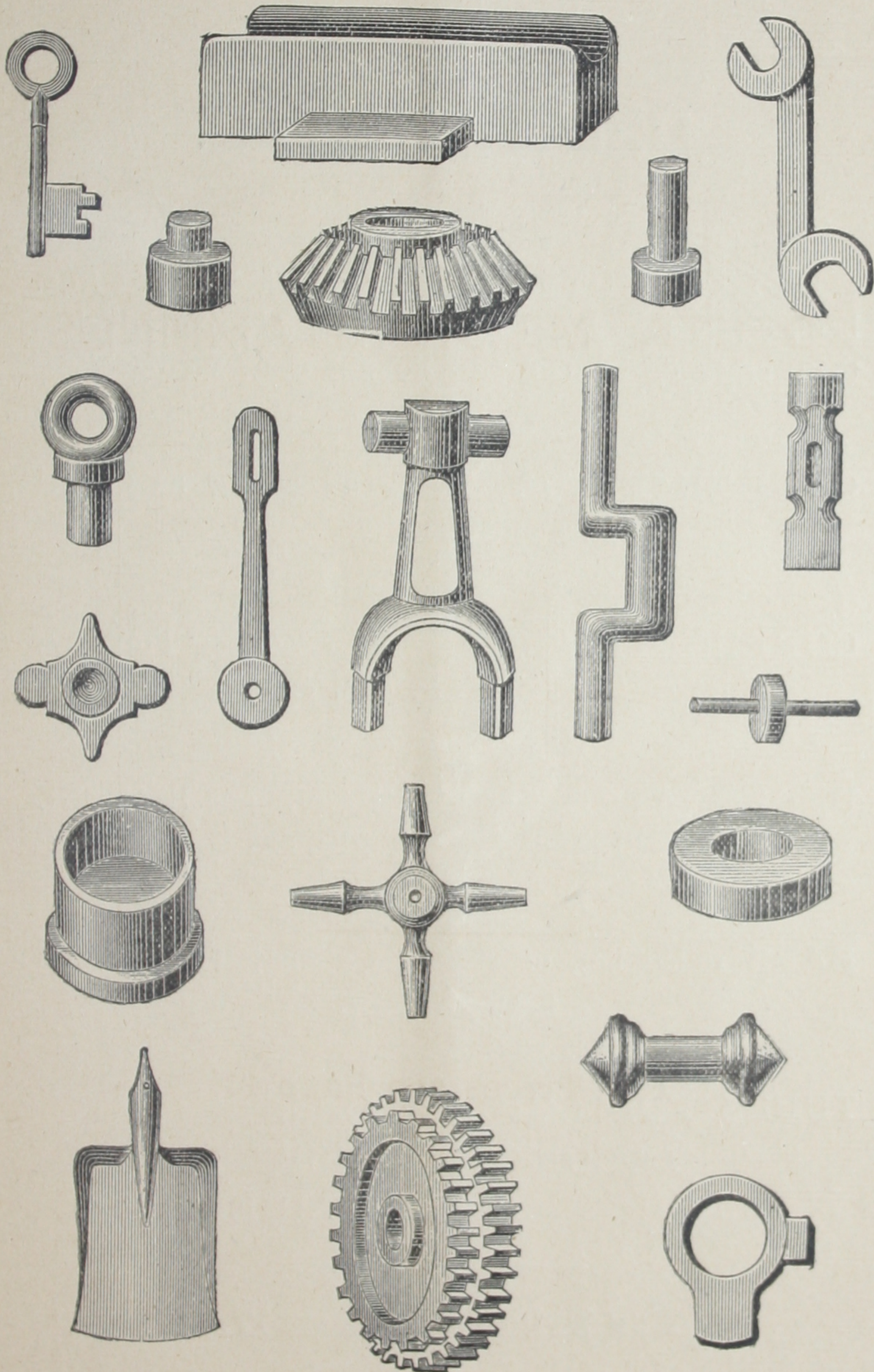
All loss arising from blow holes and other defects of castings is of course avoided.

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For Prices see Page 17.



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## DELTA METAL.

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BOLTS, NUTS, STUDS, are hot forged from bars, and as strong as Good Steel; corrode less than brass or bronze, and do not draw verdigris.

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CONDENSER PLATES as strong as Good Steel.

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CORRUGATED SHEETS for Roofing Purposes, Revolving Shutters, &c.

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PERFORATED SHEETS for Sugar Refineries, Breweries, Paper Mills, &c.

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BARs rolled hot, of various sections; as strong as Good Steel.

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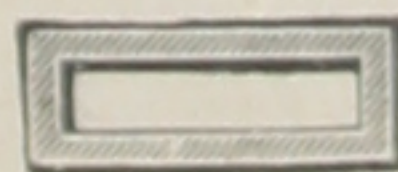
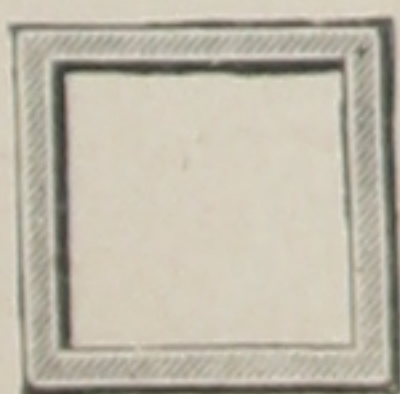
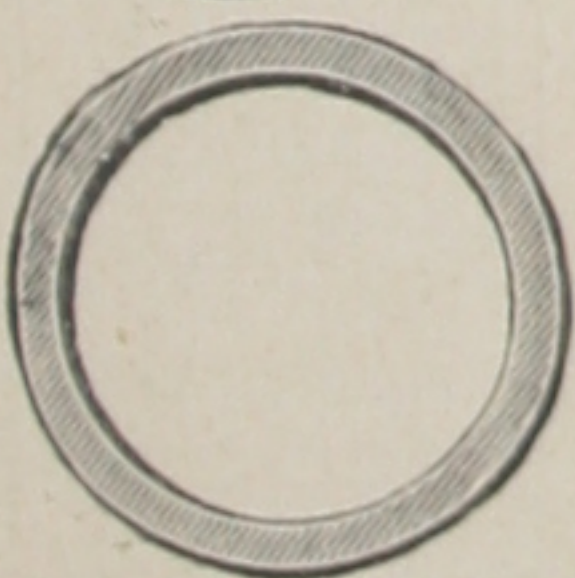
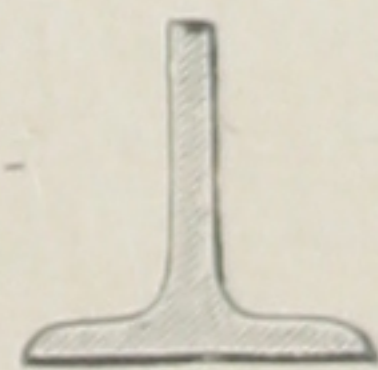
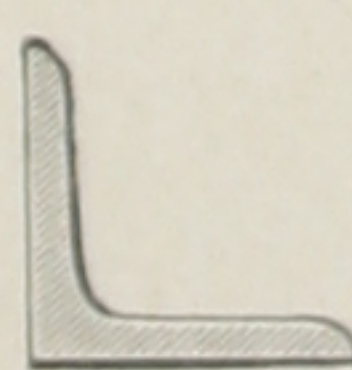
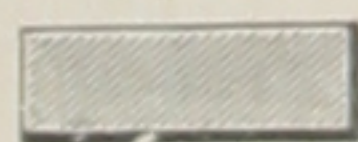
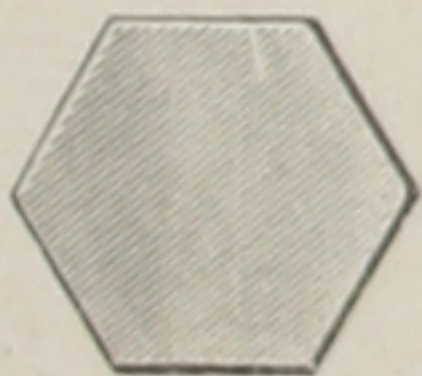
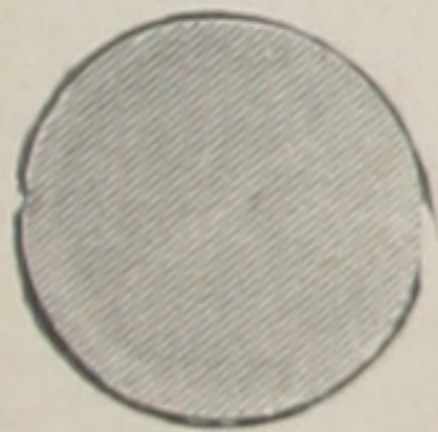
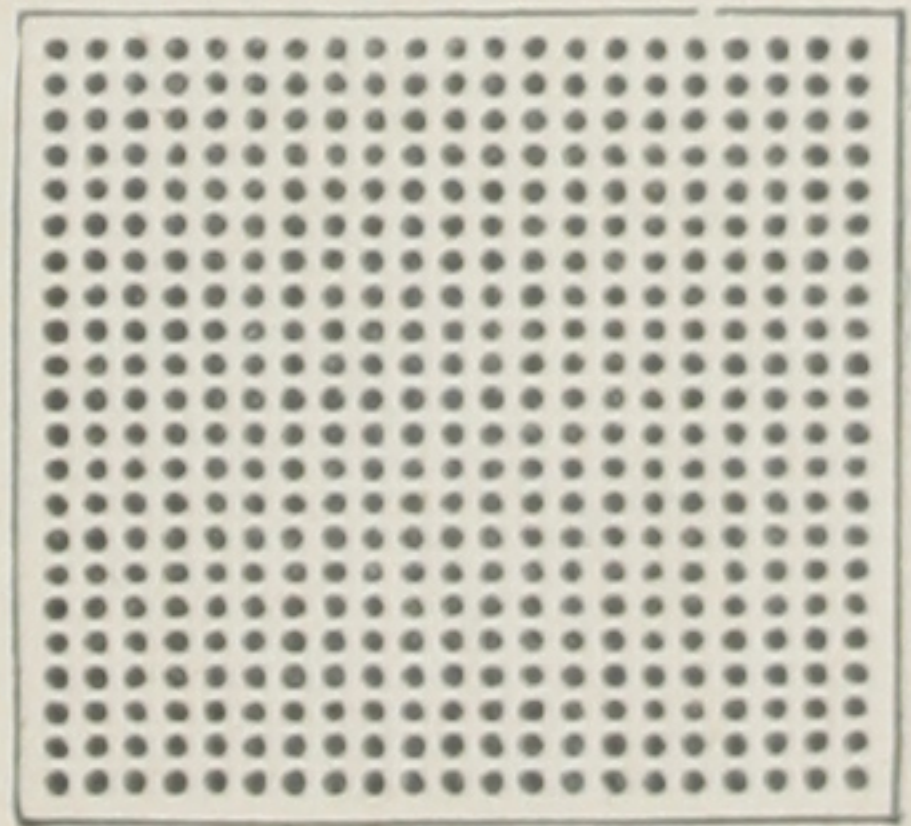
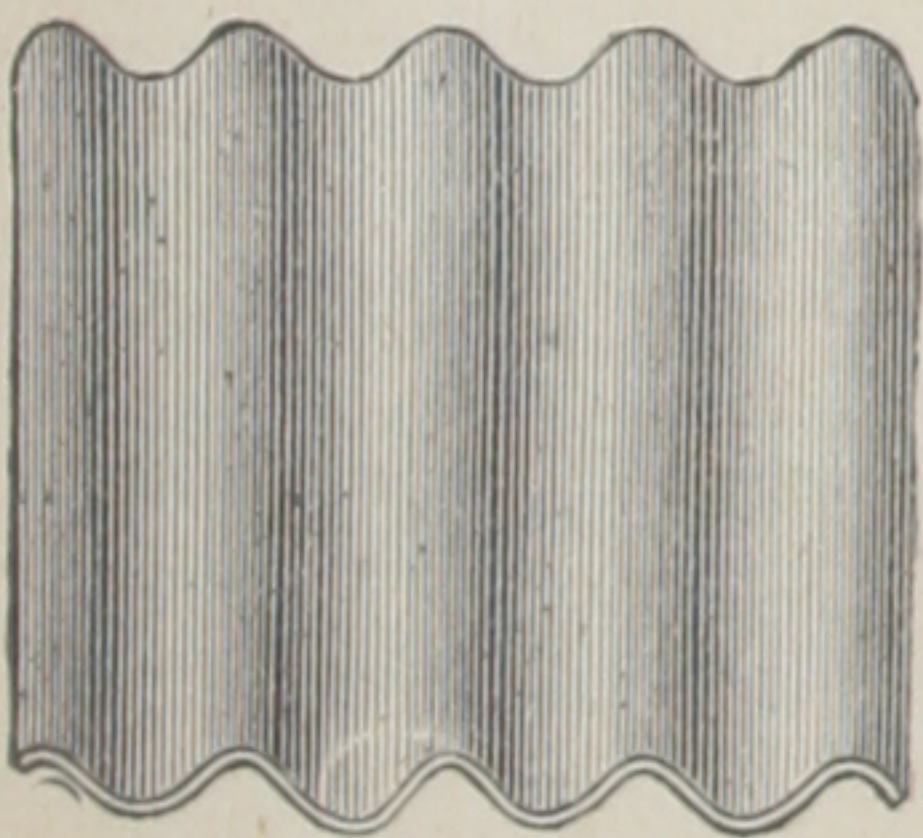
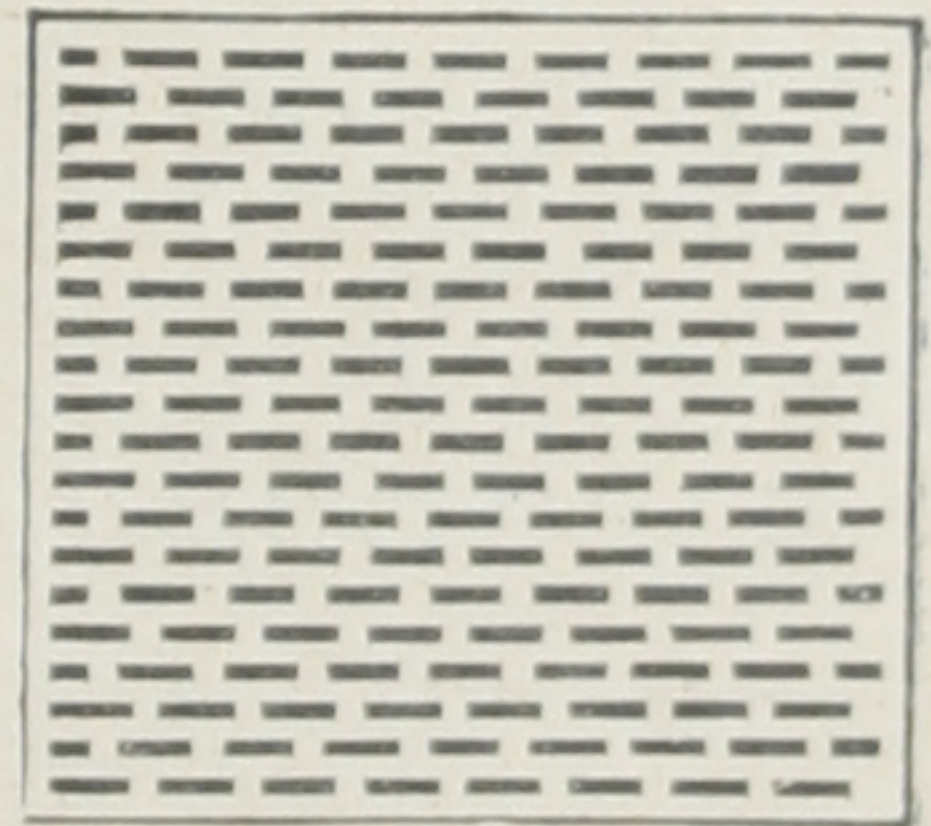
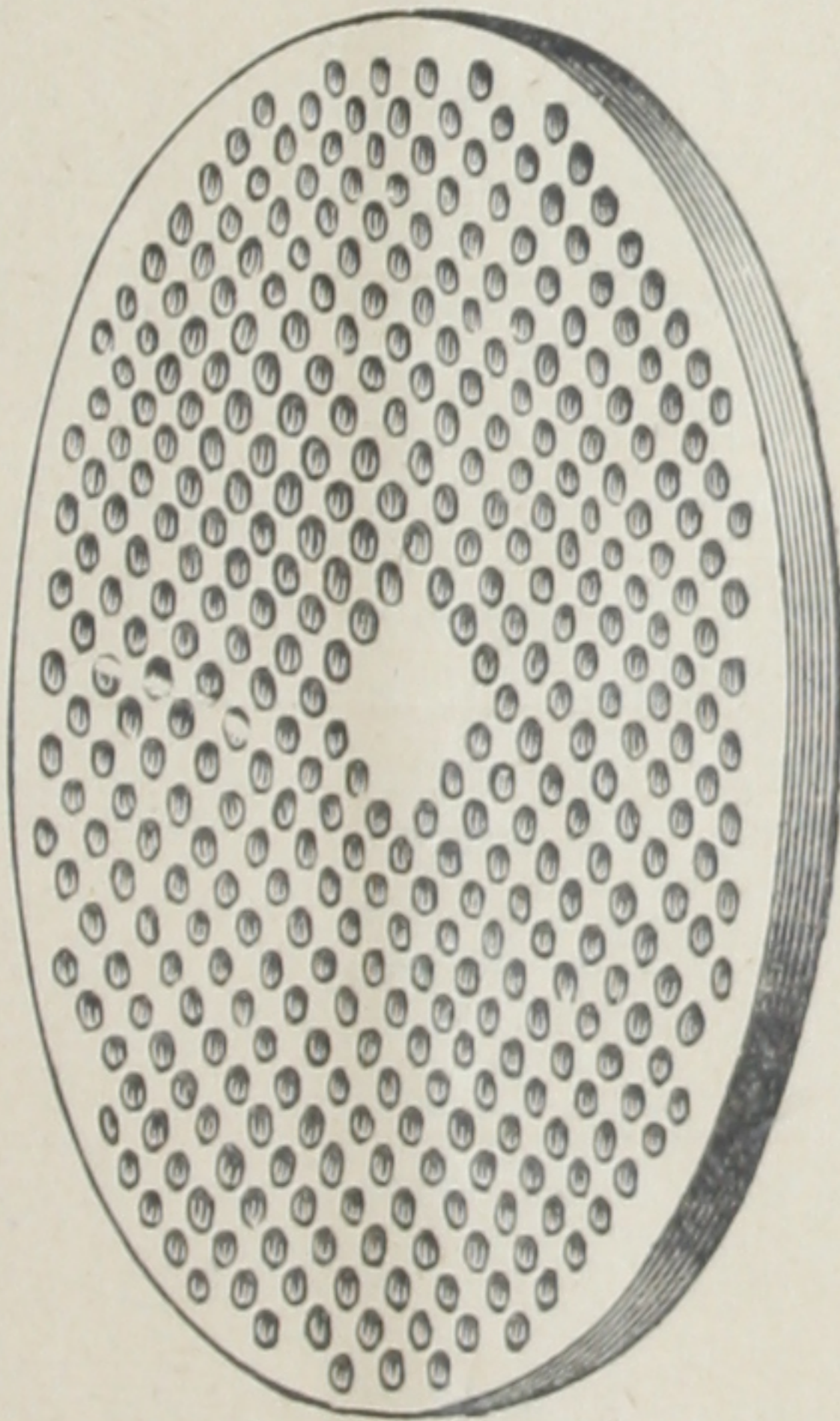
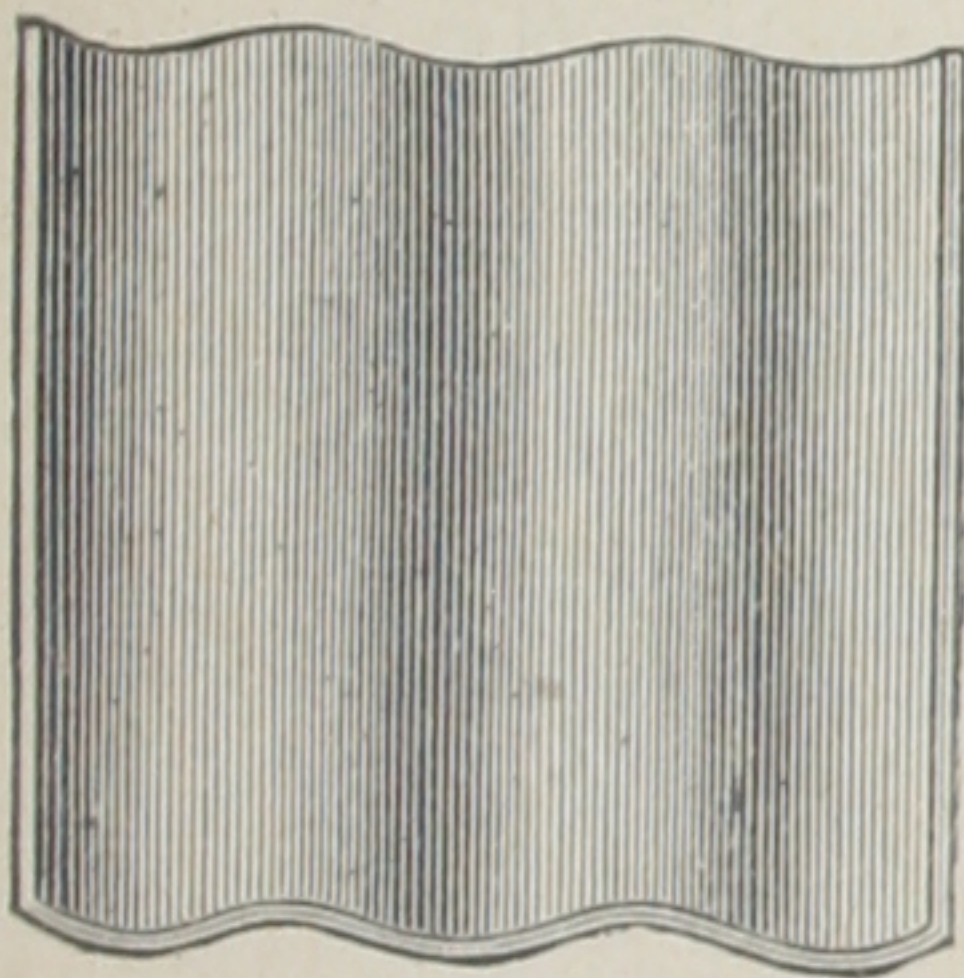
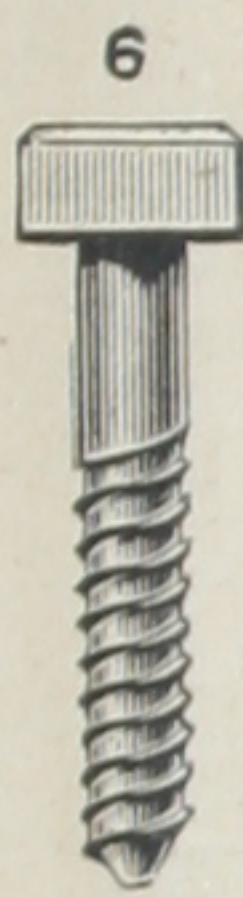
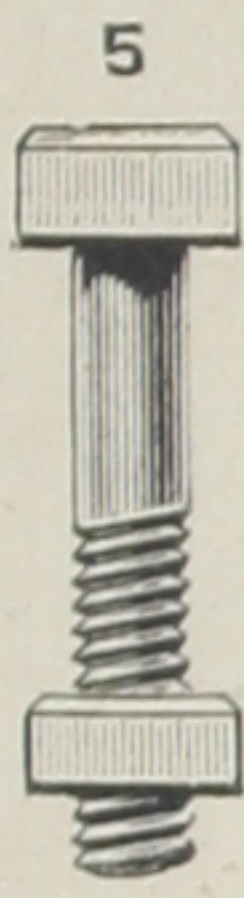
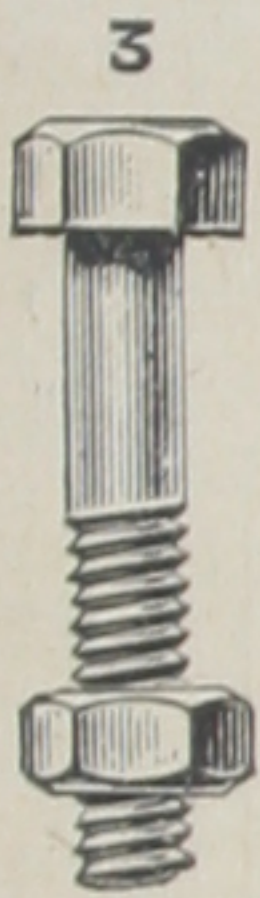
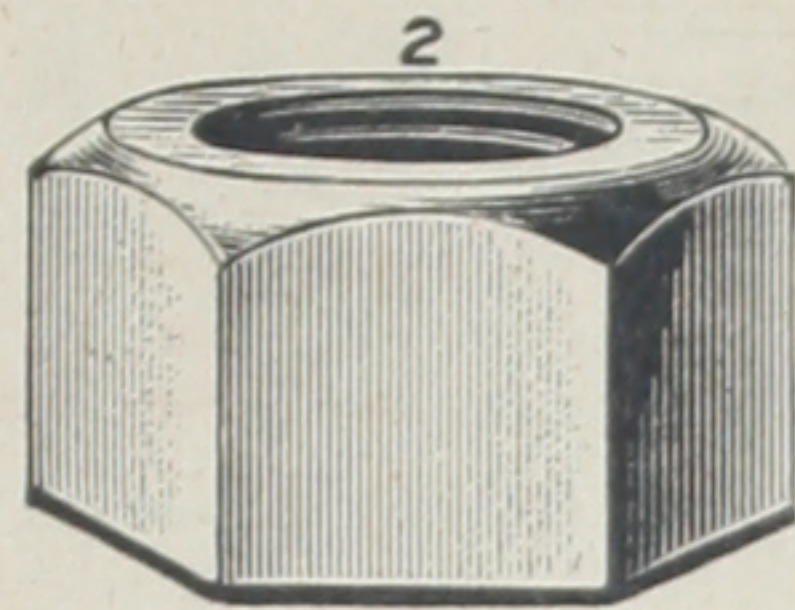
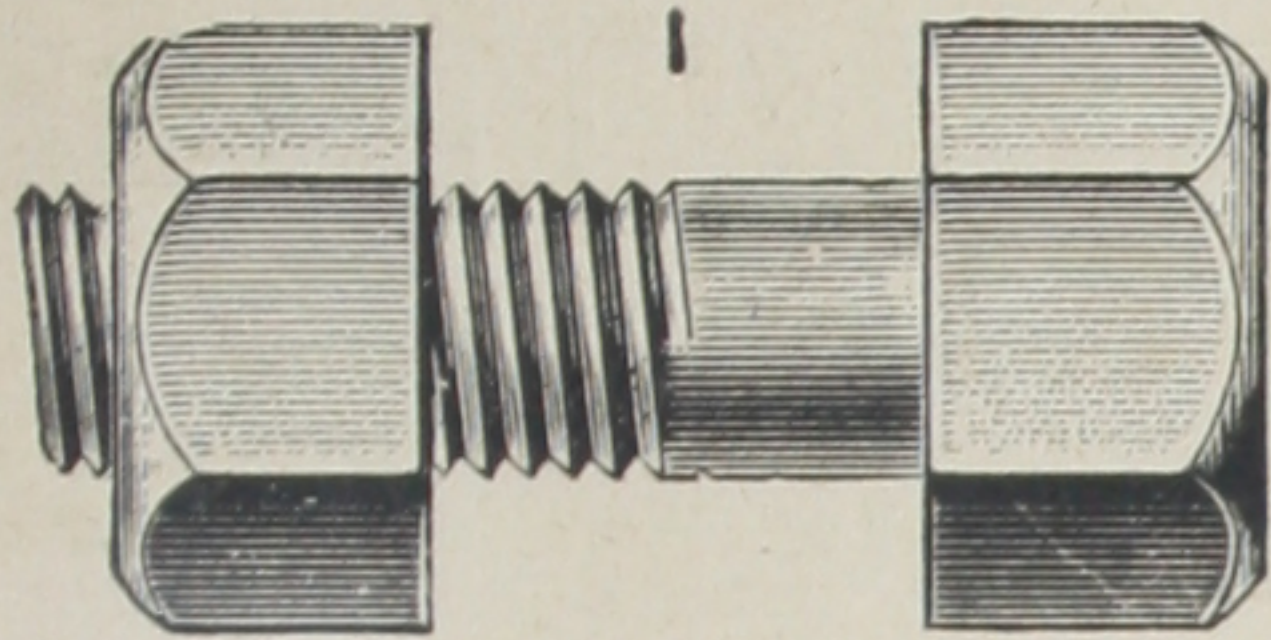
TUBES FOR CONDENSERS,  
LOCOMOTIVE TUBES,  
SHAFT LINERS, &c.

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For Prices see Page 17.



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# DELTA METAL CASTINGS.

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PROPELLERS, CYLINDERS,  
COG WHEELS, BEARINGS, CHAINS,  
ANCHORS, PISTON RINGS,  
TURBINE DISCS,  
SHAFT LINERS.

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Delta Metal Castings are as strong as Wrought Iron, and of a fine close grain. They resist the action of sea and acid water better than any bronze, and do not draw verdigris.

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*Extract from "ENGINEERING," of 22nd April, 1887,*

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## STRENGTH OF DELTA METAL CASTINGS.

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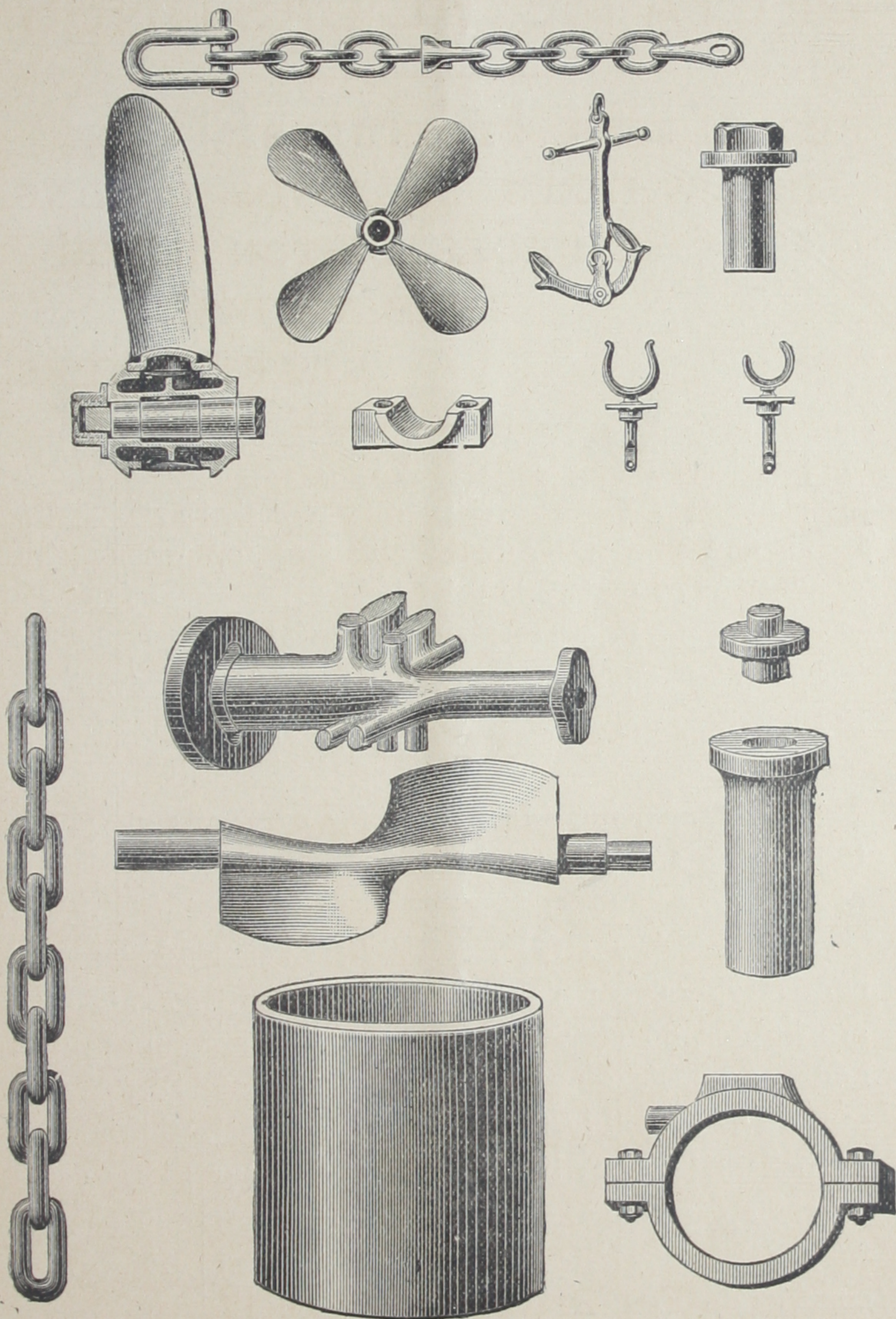
The "Schweizerische Bauzeitung" states that the large worm-wheels for the "Pilatus" Mountain Railway, were cast in Delta Metal by Messrs. SCHWEIZERISCHE LOCOMOTIVFABRIK, in Winterthur. For testing the strength and soundness of each casting separately, a test-bar was formed with the pattern, moulded and cast along with it in one piece; the bars were then cut off and tested before spending any work on the main casting, showing the following results with very slight variations:—

Tensile Strength, 36.5 kg. per sq. mm.  
= 23 tons per sq. inch.  
Elongation .. .. 10.6 per cent.

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For Prices see Page 17.







# DELTA METAL

## AS A SHIPBUILDING MATERIAL.

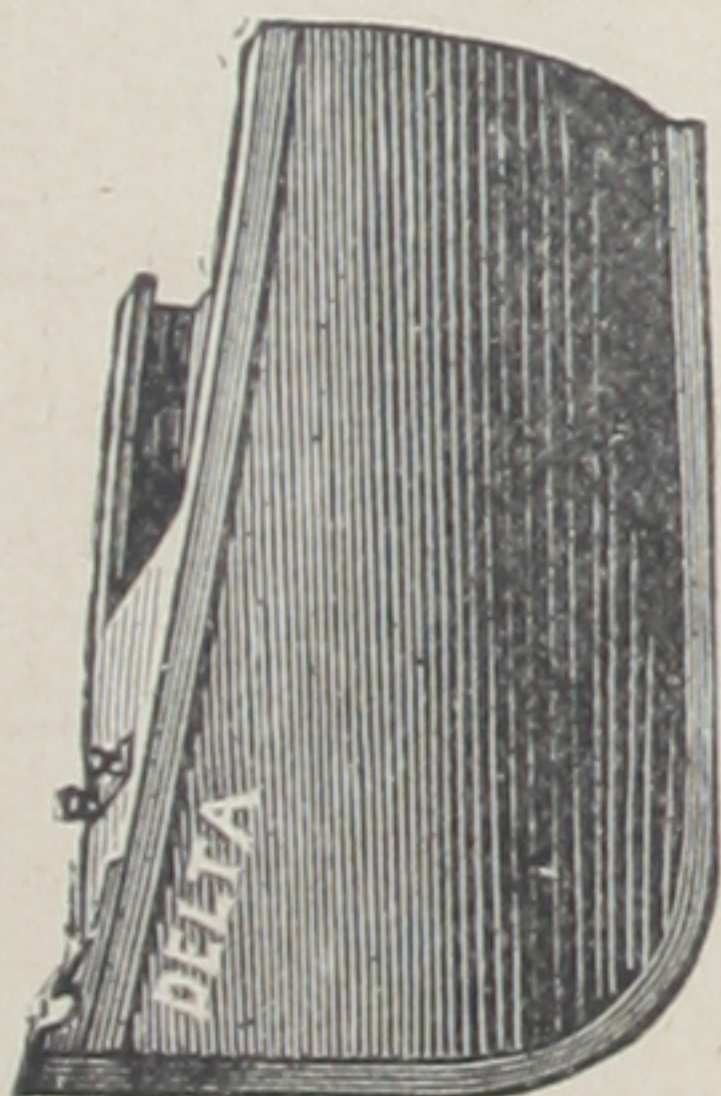
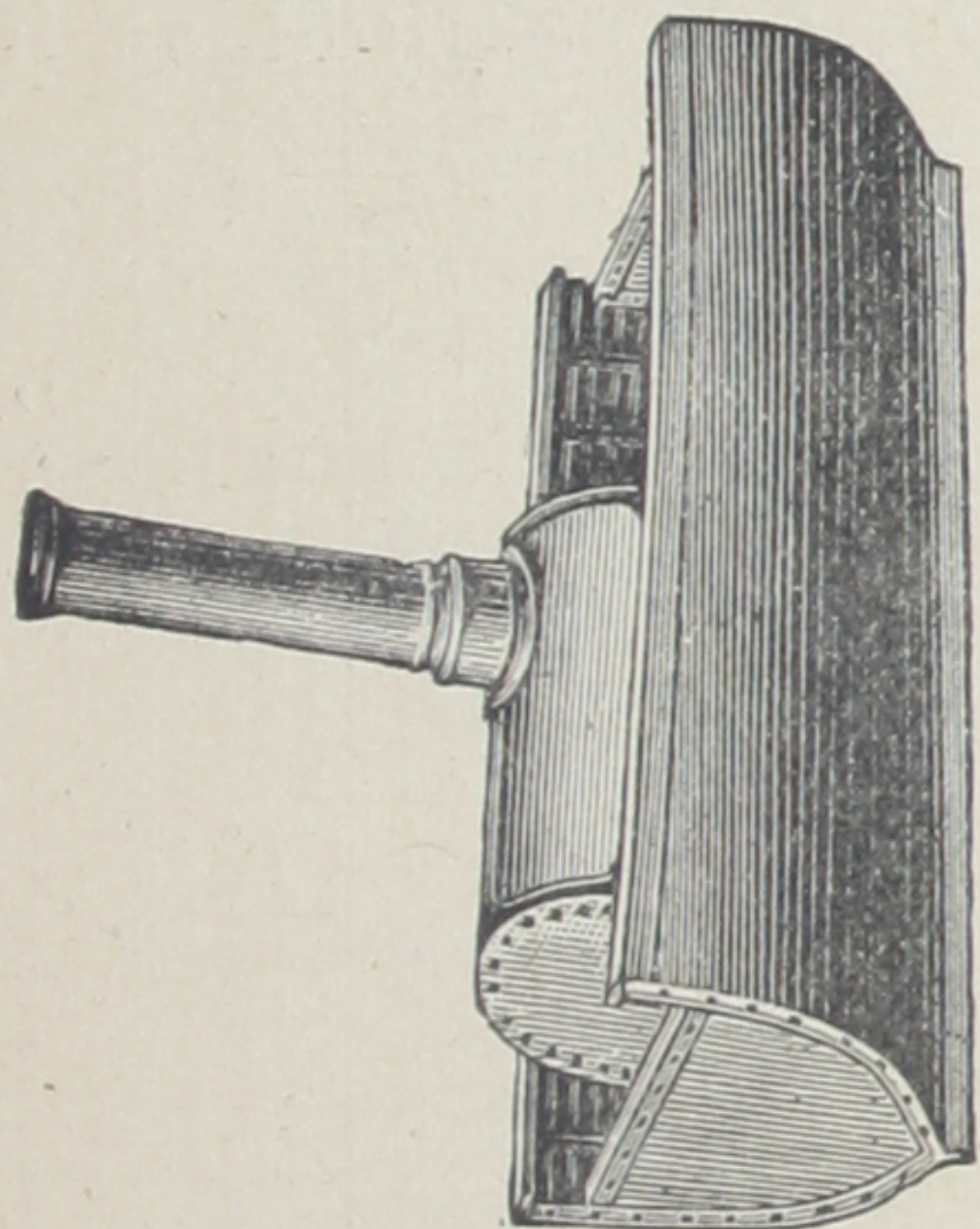
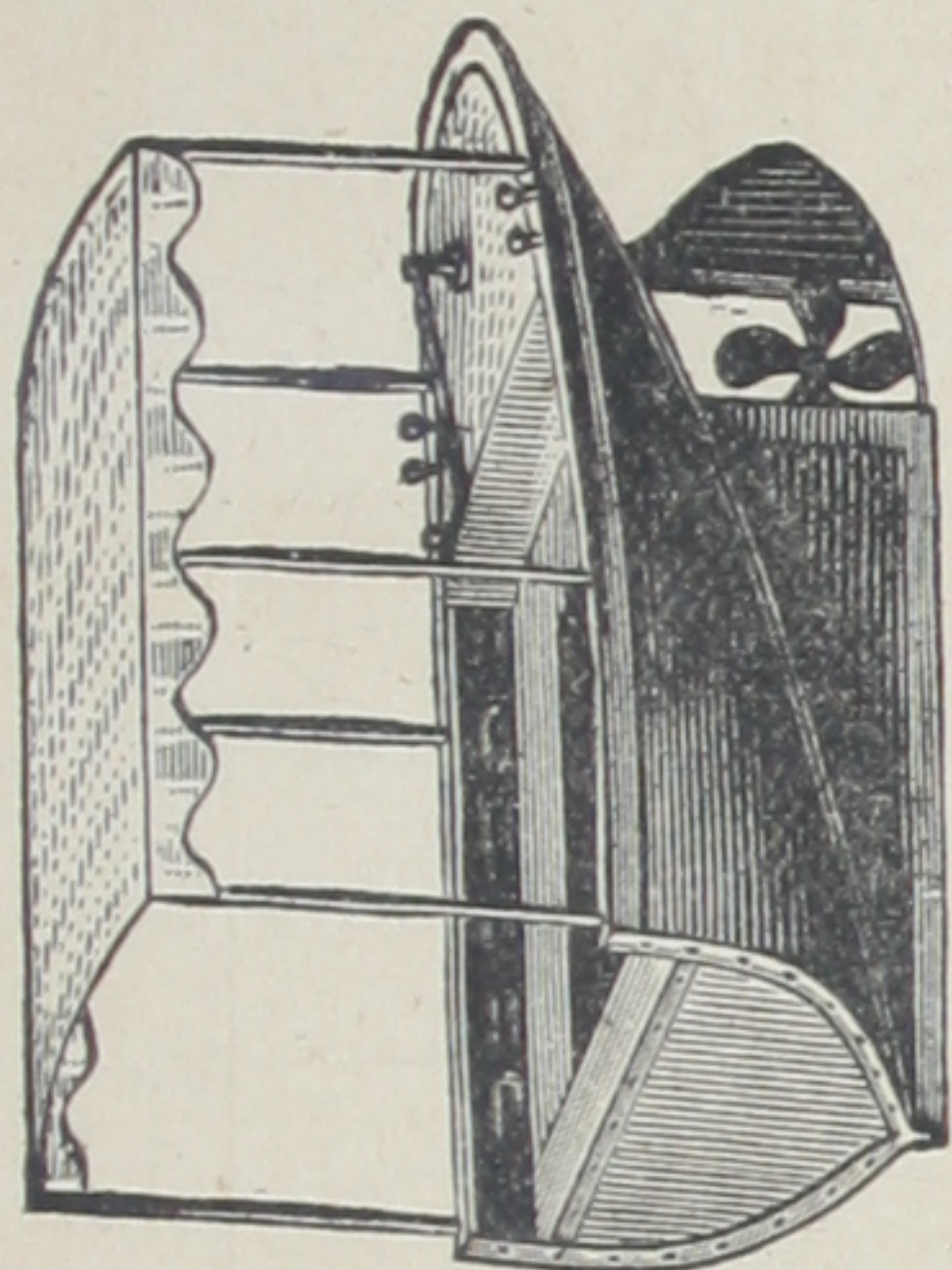
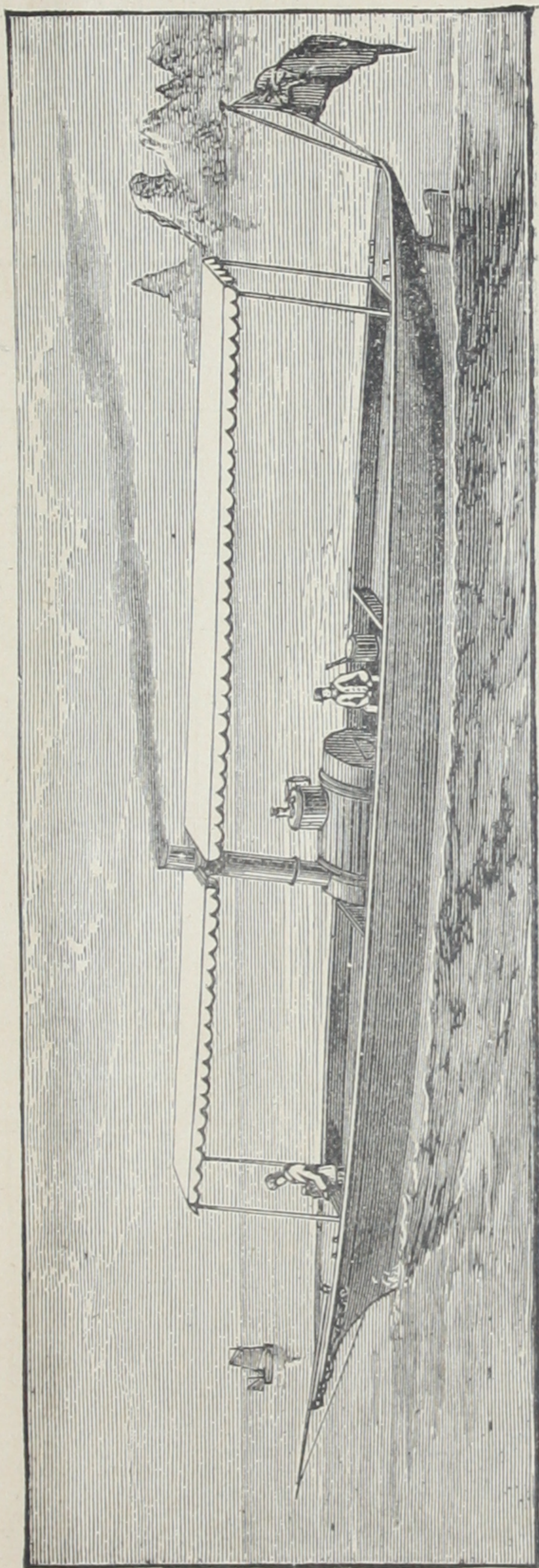
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**D**ELTA METAL Sheets, Angles, Stem and Stern Posts, Rudder Frames, &c., are as strong as Steel, and practically incorrodible in sea water. The dimensions of materials used being the same as if Steel were used, the Prices of **Delta Metal** Boats, Launches, Torpedo Boats, Yachts, &c., are but little in advance of Steel Boats, &c.

Delta Launches in sections for portage can be put together in 2 to 3 hours by unskilled labourers.

**DELTA PROPELLERS** in the end come out considerably cheaper than Cast Steel Propellers, as they are lighter, no allowance for corrosion being necessary, and the tensile strength of the two metals being the same. They will last as long as the vessel, whilst Steel Propellers have to be renewed every four to six years at great expense and loss of time. When the ship is worn out, the Delta Propellers will always be worth a considerable amount.







# ORNAMENTAL GOODS.

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CAST, FORGED, OR STAMPED.

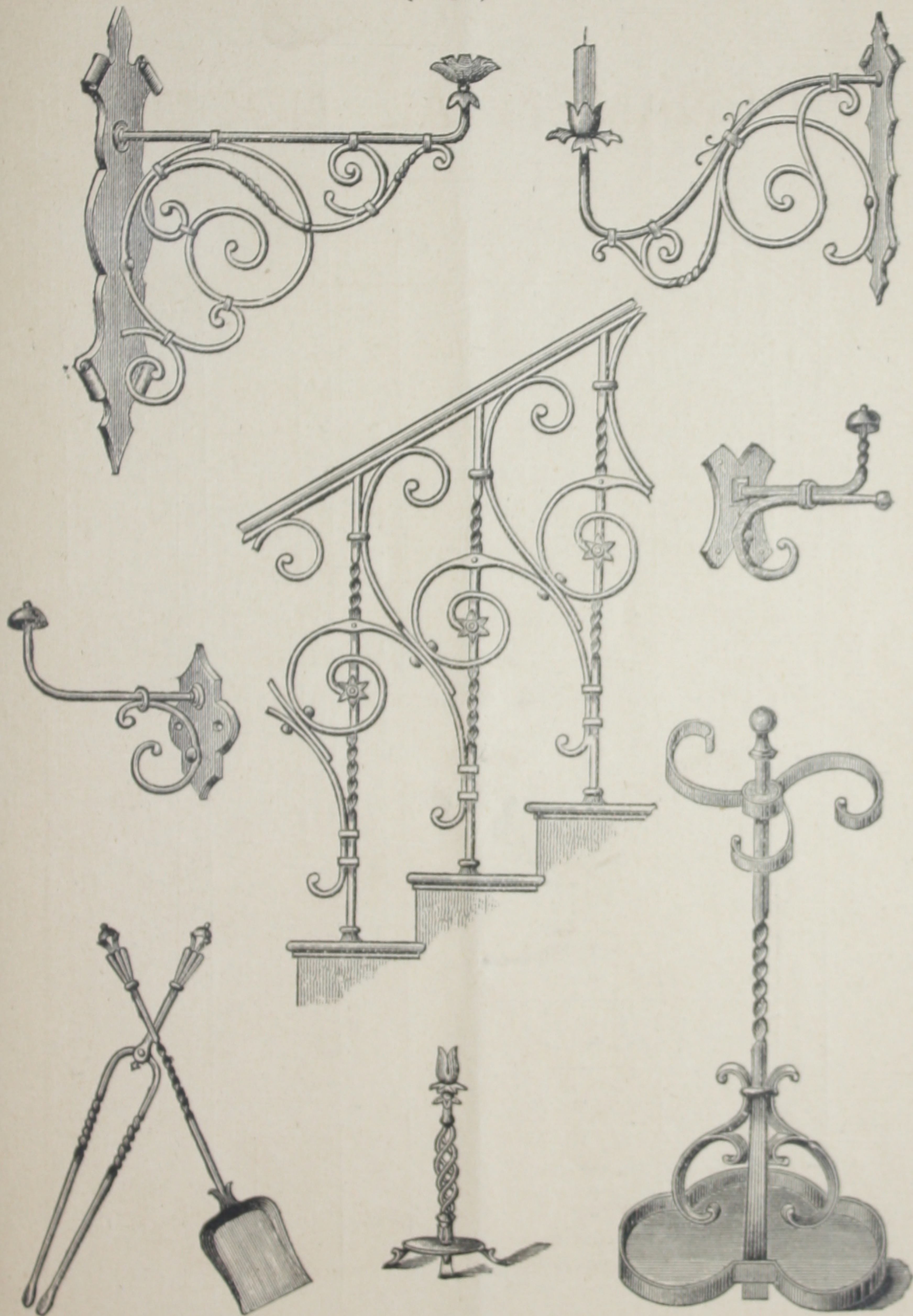
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**D**ELTA METAL is much in use for ornamental Castings, Forgings, and Stampings, on account of its rich golden colour and its great resistance to the tarnishing influence of air, gas, &c. Delta Metal Spoons, Forks, Fruit Knives, &c., are as rigid as if made of steel, and do not draw verdigris.

Bannisters, Candelabra, Hat Pegs, &c., forged in Delta Metal, look exceedingly well with corners, &c., polished, and the rest left in the black.









# TENSILE TEST.

Test Number.	Description.	Original.		Stress.		Ratio of Elastic to Ultimate.	Contraction of area at Fracture.	Stress per sq. in. of Fracture Area.	Extension set in ten inches.				Appearance of Fracture.
		Diar.	Sq. in.	Elastic per sq. in.	Ultimate per sq. in.				Per Cent.	At 50,000 lbs. per sq. in.	At 60,000 lbs. per sq. in.	At 70,000 lbs. per sq. in.	
R. 2290	Bar. I.,	Inch turned. 1'128	1'000	48800 =21'8 tons	75080 =33'9 tons	64'2	30'6	109480	0'16	0'89	6'01	21'6	GRANULAR AND SILKY.
2291	Annealed	1'128	1'000	21400 =9'6 tons	66735 =29'8 tons	32'1	33'5	100353	9'71	19'70	...	34'7	
R. 2446	No. VII.	turned 1'128	1'000	17700 =7'9 tons	46980 =20'9 tons	37'6	23'0	61012	1'96	4'31	...	19'1	SOUND.

CAST IN SAND ROLLED

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# TWISTING TEST. LENGTH OF LEVER-12 INCHES. LENGTH FOR TORSION-8 DIAMETERS.

Description.	Test Number.	Dimensions.		Stress.		Ratio of Elastic to Ultimate.	Torsion.		Effects.
		Diar.	Area.	Elastic on each end.	Ultimate on each end.		500 lbs. on each end.	Ultimate.	
"VII."	R. 2315	Inch. 1'128	Sq. in. 1,000	Lbs. 345	Lbs. 42 10 1025	P. Cent. 33'1	1 Turn = 1'000 194	1 Turn = 1'000 1'372 1'436	One end Fractured. Other end do.
"D. M. VII."	2313	do.	do.	365	1025	35'6	101	0'391 1'225	One end Fractured. Other end do.

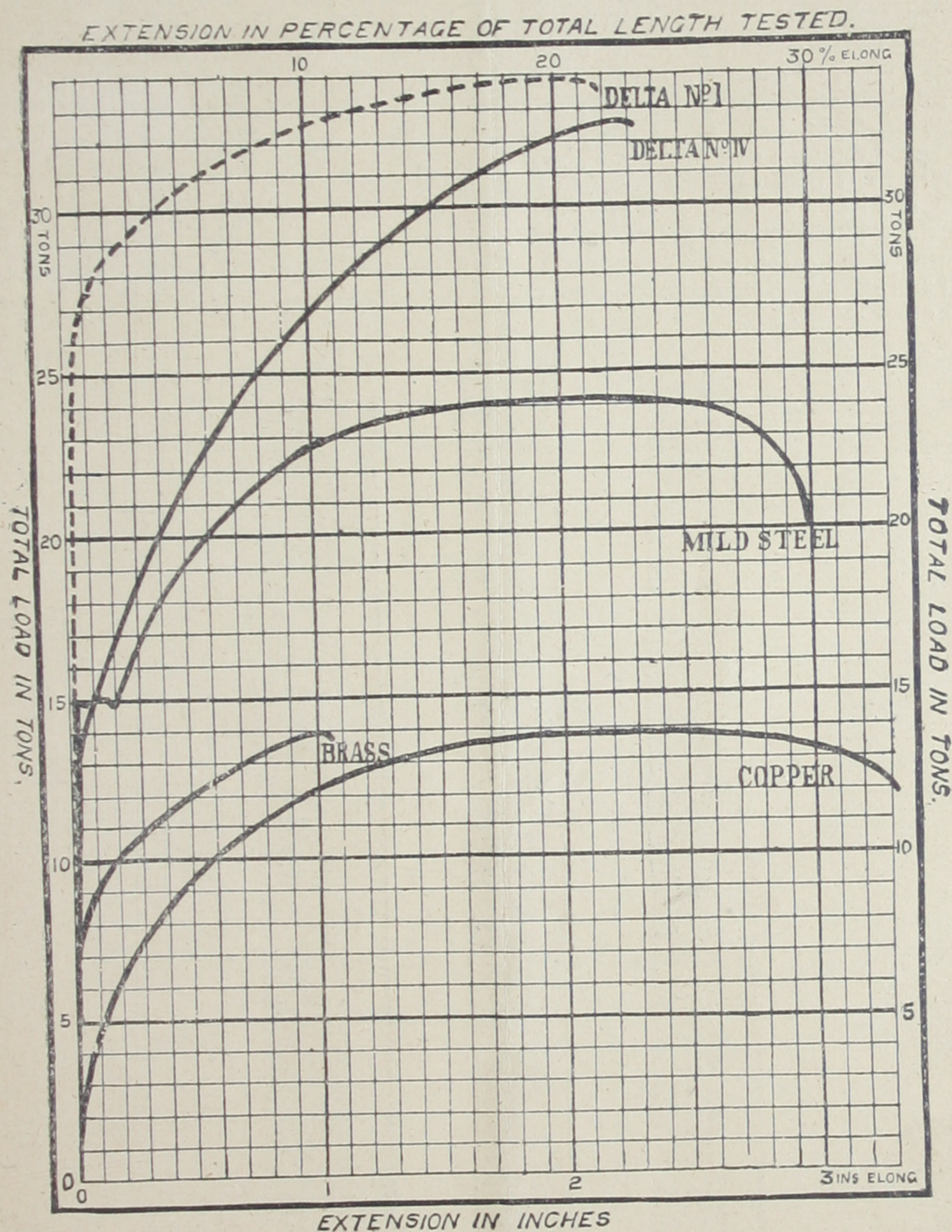
99, SOUTHWARK STREET, LONDON, S.E., 13th June, 1883.

DAVID KIRKALDY.



# THE COMPARATIVE STRENGTH OF METALS.

Extract from "ENGINEERING," of 5th August, 1887.



The diagrams above are designed to furnish a comparison of the physical qualities of samples of Delta Metal, mild steel, brass and copper. It will be noticed that the **Delta Metal** gives wonderfully good results. The curves have been plotted from those given by Mr. J. H. WICKSTEED, of the firm of Messrs. BUCKTON & Co., Meadow Lane, Leeds, in a lecture read at the Institution of Mechanical Engineers. The dotted line indicates the diagram to same scale of a test made by Mr. D. KIRKALDY.



*Extract from "THE ENGINEER," 15th July, 1887.*

## CORROSION OF METALS IN MINE WATERS.

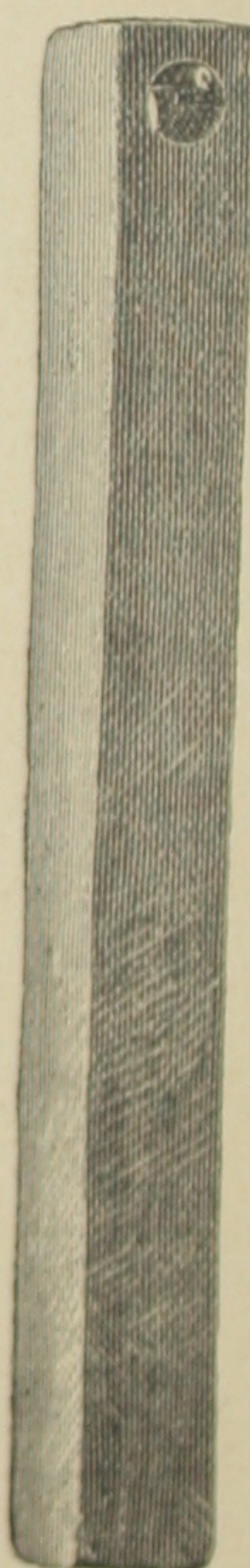
The Bonifacius Coal Mining Company, in Westphalia, having much trouble from the acid waters quickly corroding the iron and steel of their underground machinery, made a series of experiments with a view to finding the relative corrosion of metals of suitable strength. Brass and gun-metal are not strong enough, and trials were made of Steel, iron, and **Delta Metal**. Rolled bars of each of these were immersed during a period of six-and-a-half months in the water issuing from the pits at Kray, and then carefully reweighed and photographed. The bars were of 7·5 in. long, and had a sectional area of 0·62 square in. The following were the weights of the three kinds of bars before and after the trial. The condition after the tests is shown by the accompanying engravings. In consequence of the rapid corrosion of iron and steel, **Delta Metal** is now used instead for underground machinery in this and other mines.



Wrought Iron.  
lb.



Steel.  
lb.



Delta Metal.  
lb.

Weight of bars when put in ...	1·1805	...	1·2125	...	1·2787
After 6½ months ...	0·6393	...	0·6614	...	1·2633
Loss ...	46·3%	...	45·45%	...	1·2%



## PRICE LIST.

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### DELTA METAL.

Per Ton.

INGOTS, Alloy No. I. for Hot Forging, Rolling or Stamping	£
„ „ No. II. for Ornamental Work .. ..	£
„ „ No. III. for Drawing and Rolling Cold ..	£
„ „ No. IV. for Parts of Machinery requiring great strength ; for Forging Hot ..	£
„ „ No. V. for Bearings, &c. .. ..	£
„ „ No. VI. .. ..	£
SHEETS and PLATES .. .. from	d. per lb
BARS (Rolled) round, square, flat .. .. from	d. per lb
„ Hexagon Drawn .. .. from	d. per lb.
TUBES (Solid Drawn or Soldered) .. .. from	d. per lb.
WIRE .. .. from	d. per lb.
BILLETS (Cast in Chill) in No. IV. Alloy for Hot Forging .. .. from	d. per lb.
CASTINGS, FORGINGS and STAMP- INGS in Delta Metal are supplied at prices varying according to their natures and quantities ordered .. from	d. per lb.
PROPELLER CASTINGS .. .. from	£ per ton
FORGED BOLTS and NUTS, STUDS, PUMP-RODS, VALVE SPINDLES, &c. from	d. per lb.

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**TERMS:—**2½ % Discount for Prompt Cash Payment. Orders of not less than ½ Ton are Delivered Carriage Paid, or F.O.B. if for shipment.



## INSTRUCTIONS FOR CASTING AND FORGING.

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1. Use a clean Crucible, and remove any oxides adhering to its sides ; keep the Crucible specially for Delta Metal.
2. Do not mix the different Delta alloys either with each other, or with other metals.
3. When melted, throw a little charcoal or coke powder on the metal ; do not expose it too long to the fire, but as soon as sufficiently liquid take it from the fire, stir well with an iron rod ; let it stand for one or two minutes, remove the charcoal or coke powder from the surface, and pour out quickly.
4. Like all dense metals, Delta shrinks more than gun metal or brass and allowance must be made for this in the moulding. The gits and feeders must therefore be thicker, and special attention must be paid to put gits and feeders at the thickest part of the casting.
5. In re-casting the gits or old metal add not less than the same weight of new metal.
6. For forging, heat *the whole* of the metal to dark cherry red, and avoid striking when at a black heat. X